Pt. No. 74064

MODEL 241 CRYSTAL OSCILLATOR

TEN-TEC Model 241 Crystal Oscillator is an accessory, for use with TEN-TEC TRITON IV transceivers, which provides fixed crystal control of the transmitting and receiving functions. One of six crystal positions is selected by a front panel switch. A second control, designated OFFSET, allows a slight variation (in the order of ± 1.5 kHz) in the operating frequency. The exact amount depends on crystal characteristics. This allows exact setting of the frequency to an incoming signal slightly removed from the intended value. Out-of-band operation is possible within limits stated below; thus Model 241 can be used for MARS or net operations.

A front panel on-off switch returns normal VFO operation to the TRITON IV when in the OFF position. Installation only requires connecting the attached cable to the TRITON ACCESSORIES socket and procurring and installing the desired crystals.

Transceivers with Serial Numbers below 1400 require a simple VFO modification described in Service Note SN-1-540, which is attached to and a part of these instructions.

Model 241 may be used with any combination of TRITON IV accessories except those which include Model 242 Remote VFO or Model 244 Digital Readout.

INSTALLATION *

TEN-TEC, Inc. does not supply crystals for this accessory since there are an infinite number of frequency choices that may be made. It is recommended that crystals for your desired operating frequencies be purchased from a reliable crystal manufacturer, to the specifications outlined below. It is not necessary that all six positions be filled with crystals.

Out-of-Band Limits

Band	Frequency Range
80	3.4 to 4.1 MHz
40	6.9 to 7.4 MHz
20	13.8 to 14.55 MHz
15	20.8 to 21.65 MHz
10	27.8 to 30.0 MHz

Crystal Specifications

Case: HC-6/U
Terminals: .050" diameter on .486" centers.
Mode: Fundamental only. Parallel Resonance.
Load Capacitance: 20 pF. (A 32 pF crystal will operate in the circuit at a slightly higher frequency, still in range of the OFFSET control, but not on frequency when OFFSET is set to zero.)
Frequency:

Band	Mode	Crystal Frequency (f)
80-40	SB-N	f = DOF + 9.000000 MHz
80-40	CW	f = DOF + 9.000750 MHz
20-15-10	SB-N	f = DOF - 9.000000 MHz
20-15-10	CW	f = DOF - 9.000750 MHz

DOF = Desired Operating Frequency

Crystal Installation

1.) Remove top from case.

* If more than one accessory is used with the TRITON IV, see special instructions in Service Note SN-1-540, attached.

2.) Crystal sockets are an integral part of PC assembly. Insert crystals into the sockets in the desired order, starting with channel 1 farthest to the left, when viewing assembly from the top and with controls toward you. (See photo below.)
3.) Replace top.

Connection to TRITON IV

1.) Remove dummy plug from TRITON IV ACCESSORIES socket. Save plug for possible use in future if additional accessories are added.
2.) Insert plug on Model 241 cable.

OPERATION

The crystal oscillator is energized by placing the front panel slide switch to the ON position. Both transmit and receive frequencies will be the DOF (Desired Operating Frequency) used in calculating the crystal frequency in the SB-N mode and with OFFSET control set to zero. Since the 9 MHz carrier oscillator is shifted by about 3 kHz in the SB-R mode, operation when using crystal control in this mode will be removed from the DOF value by this amount. Frequency will decrease on 80 and 40 meters and increase on 20, 15 and 10.

In the CW mode, transmitted frequency is the DOF value and is also that of an incoming signal, peaked on the S Meter and with an audio tone of 750 Hz.

The OFFSET control will alter the operating frequency from the DOF value by approximately ± 1.5 kHz. Actual total deviation depends on the type of crystal cut, operating frequency, case capacitance and other characteristics. The direction of the shift will be as indicated by the + and - signs on either side of the zero mark. Plus indicates an increase in frequency. The TRITON OFFSET control is inoperative when the crystal oscillator is used.

So that the correct bandpass and output filters are employed in the TRITON for the crystal frequency in use, it is imperative that the BAND switch on the TRITON be placed in the position that includes the crystal controlled operating frequency. For the 10 meter band, only the large BAND switch need be correctly positioned.

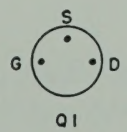
Depending on the particular crystal activity characteristic, it may be found that with low activity, oscillation will cease in or near the extreme + region of the OFFSET control. Oscillation can be restored simply by rotating the control a bit clockwise. Manufacturer-supplied crystals rarely exhibit this condition, but surplus, overtone or hand ground crystals may suffer from reduced activity.

SERVICING

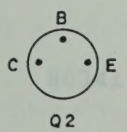
No alignment adjustments are required of Model 241. The circuit is a simple FET Colpitts oscillator, Q1, followed by emitter follower Q2. Zener diode D2 regulates the supply voltage applied to the FET at 9.1 volts. Diode D1 maintains a constant rf level regardless of frequency or crystal characteristics. The schematic, photo and semiconductor voltage readings are given below. Refer to TRITON IV manual for details in making measurements.

Semiconductor Voltage Readings - Power switch ON, cyrstal inserted.

Transistor Q1:	Drain = 9.1	Gate = 0	Source = .05
Transistor Q2:	Collector = 13.6	Base = 6.8	Emitter = 6.0

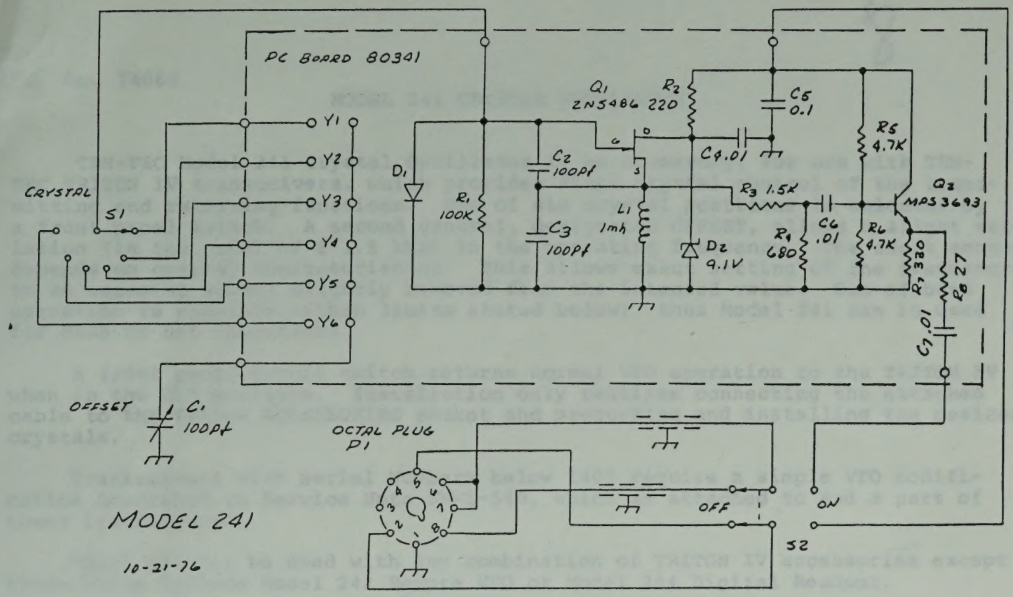


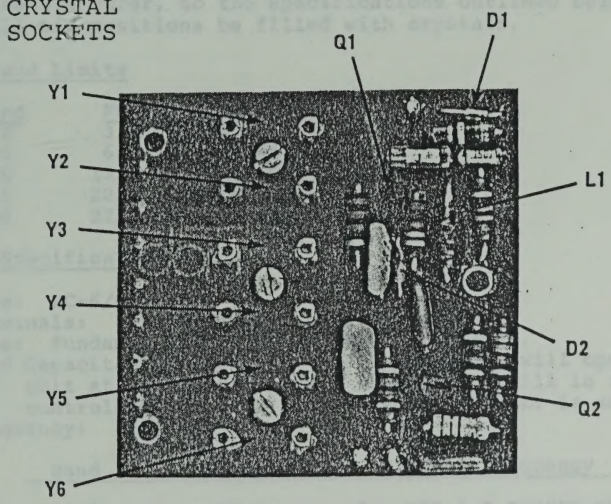
Q1



Q2

Transistor pins viewed from top of board.





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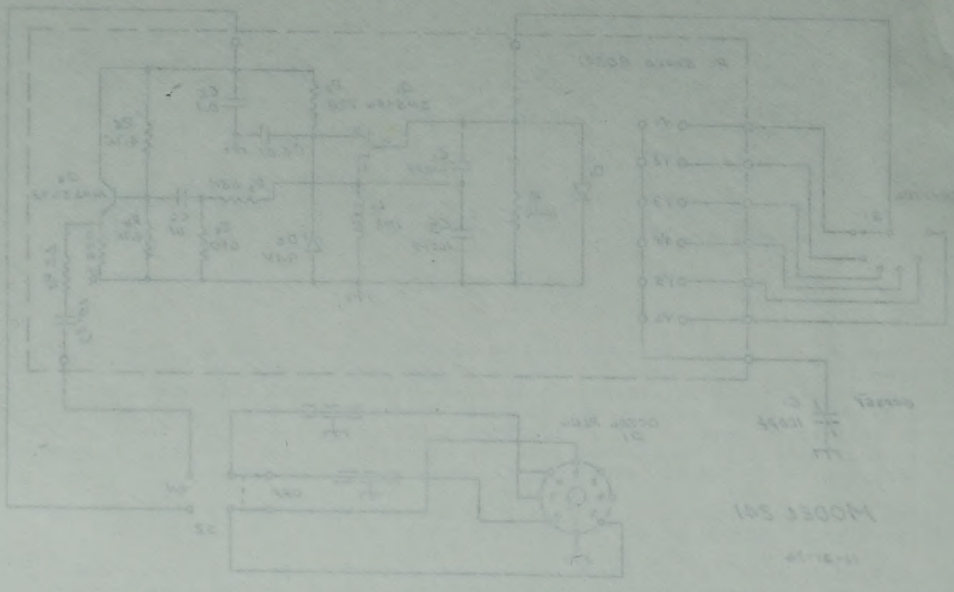

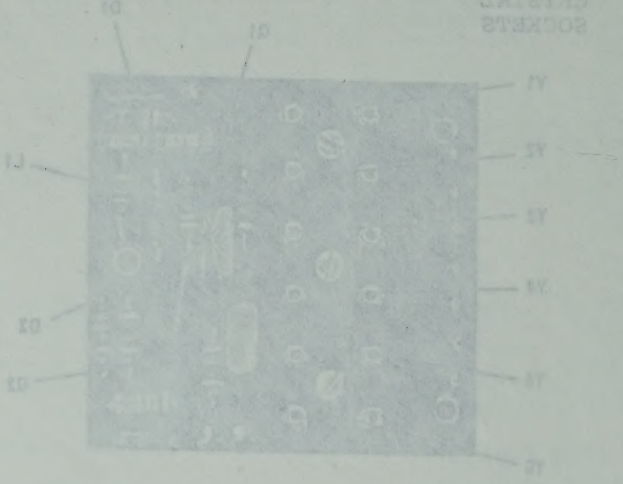

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Pt. No. 74064

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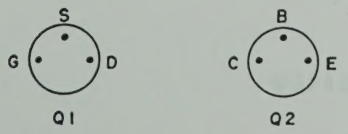
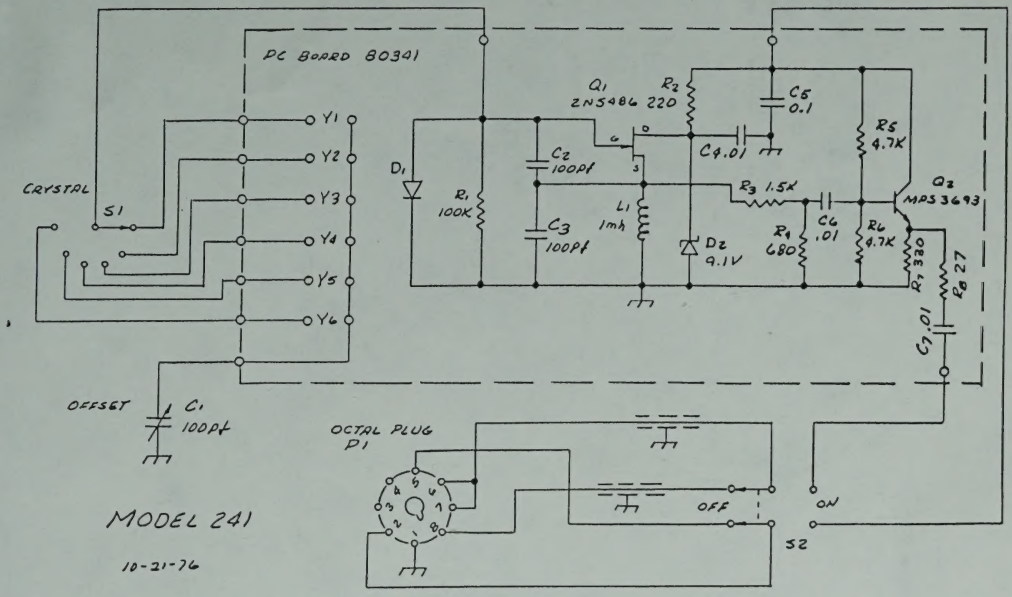
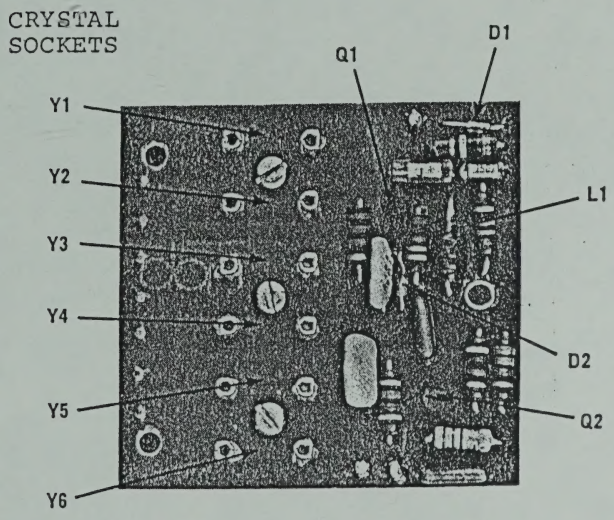


Transistor pins viewed from top of board.





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